CLAIMS

1. A fuel cell system comprising:

a fuel cell;

a hydrogen supply source supplying hydrogen to the fuel cell;

more than three ejectors disposed between the fuel cell and the hydrogen supply source and permitting excess hydrogen, expelled from the fuel cell, among hydrogen supplied to the fuel cell from the hydrogen supply source to be recirculated to the fuel cell; and

a shut-off mechanism selectively shutting off hydrogen communicating through at least one of the more than three ejectors.

2. The fuel cell system according to claim 1, wherein

each of the ejectors comprises a housing formed with a hydrogen inlet port, a hydrogen outlet port and a hydrogen recirculation port, and a valve body moveably received in the housing and incorporating a plurality of ejector sections, wherein

movement of the valve body allows either one of the plural ejector sections to be selected.

3. The fuel cell system according to claim 2, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing for a sliding and moving capability along an axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a direction in which the valve body slides such that sliding movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and

the hydrogen outlet port of the housing.

4. The fuel cell system according to claim 2, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing for a rotationally moving capability about an axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a direction in which the valve body rotationally moves such that rotational movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

5. The fuel cell system according to claim 2, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a spherical shape and received in the housing for a rotationally moving capability about a central axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a direction in which the valve body rotationally moves such that rotational movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

6. The fuel cell system according to claim 2, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing to rotationally move

about an axis of the valve body while sliding along the axis thereof, and wherein

the plural ejector sections are disposed in the valve body on a spiral configuration in communication with the hydrogen recirculation flow passage along a direction in which the valve body rotationally moves while in sliding movement such that rotational movement of the valve body while in sliding movement effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

7. The fuel cell system according to claim 2, wherein

the housing comprises a diffuser commonly used for the plurality of ejector sections.

8. The fuel cell system according to claim 2, wherein

the valve body comprises a shut-off portion to shut off the hydrogen inlet port and the hydrogen outlet port during movement thereof.

9. The fuel cell system according to claim 2, further comprising:

a shaft having one end connected to the valve body;

an actuator connected to the other end of the shaft at an outside of the housing;

a first sealing material disposed between the shaft and the housing;

second sealing materials disposed at respective contacting peripheries between the hydrogen inlet port and the hydrogen outlet port, and the valve body.

10. The fuel cell system according to claim 2, further comprising:

a sealing material disposed at respective contacting peripheries between the hydrogen inlet port, the hydrogen outlet port and the hydrogen

recirculation port and the valve body.

11. An ejector unit for a fuel cell system comprising:

a housing formed with a hydrogen inlet port, a hydrogen outlet port and a hydrogen recirculation port;

a valve body moveably disposed in the housing and incorporating a plurality of ejector sections;

wherein

movement of the valve body allows either one of the plural ejector sections to be selected.

12. The ejector unit for the fuel cell system according to claim 11, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing for a sliding and moving capability along an axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a direction in which the valve body slides such that sliding movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

13. The ejector unit for the fuel cell system according to claim 11, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing for a rotationally moving capability about an axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a

direction in which the valve body rotationally moves such that rotational movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

14. The ejector unit for the fuel cell system according to claim 11, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a spherical shape and received in the housing for a rotationally moving capability about a central axis of the valve body, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage along a direction in which the valve body rotationally moves such that rotational movement of the valve body effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

15. The ejector unit for the fuel cell system according to claim 11, wherein

the valve body comprises a hydrogen recirculation flow passage communicating with the hydrogen recirculation port, wherein the valve body has a cylindrical shape and received in the housing to rotationally move about an axis of the valve body while sliding along the axis thereof, and wherein

the plural ejector sections are disposed in the valve body in communication with the hydrogen recirculation flow passage on a spiral configuration along a direction in which the valve body rotationally moves while in sliding movement such that rotational movement of the valve body while in sliding movement effectuated in the housing allows either one of the plural ejector sections to be brought into communication with the hydrogen inlet port and the hydrogen outlet port of the housing.

16. The ejector unit for the fuel cell system according to claim 15, wherein the housing comprises a diffuser commonly used for the plurality of ejector sections.

17. The ejector unit for the fuel cell system according to claim 16, wherein the valve body comprises a shut-off portion to shut off the hydrogen inlet port and the hydrogen outlet port during movement thereof.

18. The ejector unit for the fuel cell system according to claim 11, further comprising:

a shaft having one end connected to the valve body;

an actuator connected to the other end of the shaft at an outside of the housing;

a first sealing material disposed between the shaft and the housing;

second sealing materials disposed at respective contacting peripheries between the hydrogen inlet port and the hydrogen outlet port, and the valve body.

19. The ejector unit for the fuel cell system according to claim 11, further comprising:

a sealing material disposed at respective contacting peripheries between the hydrogen inlet port, the hydrogen outlet port and the hydrogen recirculation port and the valve body.

20. A fuel cell system comprising:

a fuel cell;

a hydrogen supply source supplying hydrogen to the fuel cell;

more than three ejector means disposed between the fuel cell and the hydrogen supply source and permitting excess hydrogen, expelled from the

fuel cell, among hydrogen supplied to the fuel cell from the hydrogen supply source to be recirculated to the fuel cell; and

shut-off means for selectively shutting off hydrogen communicating through at least one of the more than three ejector means.

21. An ejector unit for a fuel cell system comprising:

housing means formed with a hydrogen inlet port, a hydrogen outlet port and a hydrogen recirculation port;

valve body means moveably disposed in the housing means and incorporating a plurality of ejector means;

wherein

movement of the valve body means allows either one of the plural ejector means to be selected.

22. A method of controlling a fuel cell system, the method comprising:

preparing a fuel cell;

preparing a hydrogen supply source to supply hydrogen to the fuel cell;

preparing a plurality of ejectors disposed between the fuel cell and the hydrogen supply source;

supplying hydrogen to the fuel cell for electric power generation;

expelling excess hydrogen from the fuel cell as a result of non-use for the electric power generation; and

selectively shutting off the plurality of ejectors depending on a demanded parameter to allow the excess hydrogen, expelled from the fuel cell, to be recirculated thereto through at least selected one of the plurality of ejectors.

23. A method of operating an ejector unit for a fuel cell system, the method comprising:

preparing a housing formed with a hydrogen inlet port, a hydrogen outlet port and a hydrogen recirculation port;

preparing a valve body disposed in the housing to be moveable and incorporating a plurality of ejector sections; and

actuating the valve body to a selected position to allow either one of the plural ejector sections to be selected for communication with the inlet port, the hydrogen outlet port and the hydrogen recirculation port.